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SPECIFICATION FOR FABRICATION OF THE TEN DRUM OVERPACK

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For

U. S. Department of Energy

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SPECIFICATION E-I-430 RECORD OF REVISION

ECO/REV NUMBER DATE	PAGES AFFECTED	REVISION DESCRIPTION
8980/Rev. 0 3/23/98	All	Specification created
9645/Rev. 1 01/14/00	All	ECO 9645 to update requirements.
9945/Rev. 2 11/14/00	3, 4, 5, 9, 11	Correct minor deficiencies identified by a review for centralized procurement.
10,179/Rev. 3 06/26/01	2, 4, 6, 7, 8, 9, 10, 11	Update Specification to accommodate new Drawing.
10,299/Rev. 4 2/20/02	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Updated QA section and made minor changes for consistency.
10,454/Rev. 5 6/06/02	5, 9, 10	Clarified Leak Testing procedure requirement and personnel qualifications.
10,634/Rev. 6 12/5/02	6,9,10	Add Inspection requirements for the lid, body and assembly
11,165/Rev. 7 11/09/04	ii, 1, 3, 5, 6, 7, 11	Added powder coating option.

U. S. DEPARTMENT OF ENERGY
WASTE ISOLATION PILOT PLANT

SPECIFICATION E-I-430
TEN DRUM OVERPACK

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1.0 SCOPE

1.1 Purpose

The purpose of this specification is to convey fabrication instructions, testing and acceptance criteria for the TRUPACT-II Ten Drum Overpack (TDOP) unless otherwise specified on the drawings or procurement documentation.

1.2 Background

The TDOP was developed to package and transport contact-handled transuranic waste to the Waste Isolation Pilot Plant (WIPP) utilizing the TRUPACT-II (Type B) transport packaging or can be used as a stand-alone DOT 7A, TYPE A packaging. The TDOP was qualified by the U.S. Department of Energy (USDOE) in 1993 as meeting the U.S. Department of Transportation (USDOT) requirements for Specification 7A Type A packagings. Qualification has been documented in the USDOE, *DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging,* under Docket Number 90-16-7A.

1.3 Definitions

AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CMTR	Certified Material Test Report
TDOP	TRUPACT-II Ten Drum Overpack
WTS	Washington TRU Solutions
WIPP	Waste Isolation Pilot Plant
Buyer	The TDOP procuring organization
Seller	The TDOP fabricating organization

2.0 APPLICABLE DOCUMENTS

2.1 USDOT 7A TYPE A Compliance Documents

A. Title 49 of the Code of Federal Regulations, Part 178, Section 178.350 (49 CFR 178.350), and Part 173, Section 173.474 (49 CFR 173.474).

B. DOE/RL-96-57 (Volumes 1 and 2), Test and Evaluation Document for the U.S. Department of Transportation Specification 7A TYPE A Packaging.

2.2 WIPP Shipment Compliance Document

A. WP 08-PT.02, Ten Drum Overpack Handling and Operation Manual

2.3 Construction Drawings (Current Revision)

165-F-010 W1 thru W6, TRUPACT-II Ten Drum Overpack

2.4 Codes, Specifications, and Standards

The current edition of codes, specifications, and standards at the time of fabrication shall be utilized.

The codes, specifications and standards referred to by number or title in this specification or on the contract drawings, shall form a part of this specification:

AISI 1018	American Iron and Steel Institute, Carbon Steel Specification
AISI 1026	American Iron and Steel Institute, Carbon Steel Specification
ASME Q00050	Boiler and Pressure Vessel Code, Section V, Nondestructive Examination
ASME Q00090	Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications
ASME NQA-1	QA Requirements for Nuclear Facilities
ASNT	Recommended Practice No. SNT-TC-1A
ASTM A-36	Standard Specification for Carbon Structural Steel
ASTM A-513	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
ASTM A-516	Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower Temperature Service
ASTM A-537	Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel

ASTM A-865	Standard Specification for Threaded Couplings, Steel, Black, or Zinc-Coated Welded or Seamless, for use in Steel Pipe Joints
ASTM B-633	Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM D-1056	Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber
ASTM D-1186	Standard Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
ASTM D-3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM D-3451	Standard Guide for Testing Coating Powders and Powder Coatings (as applicable)
ASTM F-835	Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
AWS D1.1	Structural Welding Code – Steel

3.0 DESIGN REQUIREMENTS AND PERFORMANCE CRITERIA

3.1 Description

The TDOP consists of a cylindrical body with flat top and bottom end profiles and a bolt-on continuous gasket sealed lid. Thirty-six capscrews, inserted into the lid perimeter, counter-bored holes, and a combination of ten carbon composite filters and pipe plugs, installed in pipe thread tapped ports located in the shell flange at the upper perimeter of the cylindrical body, are part of the containment system.

3.2 Material Requirements

All materials of construction shall meet the requirements of this specification and those defined in 2.3 above.

Materials of construction (structural, weld wire, fasteners, etc.) shall be traceable by Heat or Lot number to a completed TDOP. Certified Material Test Reports (CMTRs) shall be included in the Data Package.

All raw material receiving records, inspection record and or traceable documentation shall be kept on file by the manufacturer and shall be available to the Buyer upon request. All such documentation shall also be traceable to a finish unit serial number.

3.3 Fabrication Requirements

3.3.1 Assembly

Prior to assembly, all components shall be cleaned of cutting oils, marking dyes, weld flux, spatter, scale grime and all other foreign materials. Finished assembly and all interior areas shall be cleaned and visually inspected to verify that all surfaces are free of particles and liquids.

All components shall be assembled, tack-welded in place prior to final welding so that the unit dimensional and geometric properties can be checked and or adjusted if required.

All components shall provide and or accommodate a proper fit-up to facilitate proper weld joint integrity. Gaps at weld joints of more than 1/8 inch shall not be permitted and the use of metal fillers to bridge weld joint gaps shall not be used.

Temporary bracing to hold dimensional and geometric characteristics during the final weld-off process may be used. All weld tacks shall be removed with the bracing.

Manufacturing processes shall be documented and controlled by instructions, procedures, checklists, travelers, or other appropriate means. Completed fabrication travelers shall be included in the Data Package.

Components shall be worked to allow for proper heat dissipation during the operation so that the material will not become brittle or deform due to overheating.

All sharp edges and corners shall be removed. The finished part dimensions and geometry shall comply with the applicable detail drawings.

3.3.2 Welding

All welds shall be made using a qualified procedure and qualified welding personnel in accordance with AWS D1.1 or ASME Section IX. Welder qualification records and weld procedures (including weld repair) shall be submitted to the Buyer in accordance with Attachment A.

All welding instructions such as weld placement, size, and configuration shall comply with applicable drawings.

All welds shall be visually inspected prior to painting/coating for acceptance in accordance with AWS D1.1. Visual weld inspectors shall be qualified per AWS D1.1. Welds failing the acceptance criteria shall be repaired in accordance with AWS D1.1.

During final welding, care should be exercised to ensure deformation or distortion of components or subassemblies are held to a minimum, but within drawing tolerances, by the use of proper welding techniques to adequately dissipate excessive heat. Such techniques shall consist of, but shall not be limited to the use of welding fixtures, temporary bracing, skip welding, and cool down periods.

3.3.3 Serialization

All units shall be serialized by means of a unique 6-digit serial number, stamped in 2 locations, per fabrication drawings. All data package records and supporting documentation shall reference each container by serial number.

3.3.4 Leak Testing

Before applying the paint/coating, each Ten Drum Overpack (TDOP) lid and body assembly shall be examined by:

Note: Leak Testing may be performed before or after welding lift clips to assembly.

A. Implementing a written leak test procedure in accordance with ASME Section V, Article 10. Personnel shall be qualified in accordance with ASNT Recommended Practice No. SNT-TC-1A. Leak test technicians shall be qualified SNT-TC-1A Level II minimum, instructed in the proper application of the test procedure, and shall be monitored by the quality assurance function;

B. Establishing a 1/2 to 1 psig pneumatic pressure differential as measured with a calibrated pressure gauge graduated in not less than 1/10th pound increments;

C. Utilizing an approved leak detection solution applied to all external containment welds;

D. Repairing the weld if a leak is detected in accordance with AWS D1.1 and retested.

Caution: The pneumatic pressurization system shall be equipped with a pressure relief device that limits the pressure to a maximum of 3 psig.

Note: Welds attaching the lift clips to the TDOP body are not subject to leak testing. However, should a lift clip weld be identified for repair, and the repair directly compromises a previously tested weld joint, then a leak test will be performed on the area of repair.

3.4 Painting/Coating Requirements

Note: All weld inspections and leak testing shall be completed prior to painting/coating.

All exterior and interior surfaces of the TDOP shall be painted/coated (final coat white) as specified herein. However, surfaces specified to be plated shall not be sandblasted or painted/coated unless specifically required by approved drawings, or procurement documents.

The paint or coating systems, including primer and top coats, shall be applied in accordance with the manufacturer's recommendations. Systems utilized shall be in accordance with approved drawing requirements and procurement specifications.

3.4.1 Paint/Coating Pre-Qualification and Inspection

A. Pre-Qualification of Paint/Coating System

(1) The paint/coating system shall be pre-qualified prior to use. The purpose of the qualification process is to demonstrate the adhesion characteristics of the paint/coating product when applied to a prepared steel substrate surface. The qualification process shall include:

(a) Cut 3 sample coupons ($\approx$1 ft^2) representative of the sheet material used in the construction of the TDOP;

(b) Prepare the surface of the coupons using the surface preparation method proposed for TDOP production. The method shall be documented and implemented in the production painting/coating process;

(c) Apply the proposed paint/coating system to obtain a minimum of 3 mil (dry film) thickness;

(d) After the paint/coating has dried in accordance with the manufacturer's instructions, the paint/coating shall be tested for adhesion performance.

(e) The paint/coating system shall obtain a 4B classification or better, when tested in accordance with Method B of ASTM D-3359.

(2) The Buyer shall ensure the proposed paint/coating system is compatible with the contents to be shipped.

(3) When requested by the Buyer, Seller shall submit the sample coupons to the Buyer for approval.

B. Production Paint/Coating Inspection

(1) Paint/coating thickness on each TDOP shall be measured in the location identified in (2) below) and shall meet a minimum dry film thickness of 3 mils exterior and 1.5 mils interior. The method of measurement shall be in accordance with ASTM D-1186, Method A, or an approved equal.

(2) Paint/coating adhesion shall be tested on the first production unit of every lot and on every 25th unit thereafter. The paint/coating adhesion shall meet the performance standard stated in A(1)(e) above and shall be tested at the following locations:

- 1 each, on the top center of the lid;
- 2 each, at 180 degrees apart on side of the body

Once the adhesion test is completed, the Seller shall repaint the test-affected areas.

4.0 FIELD EXECUTION

The Ten Drum Overpack Handling and Maintenance Manual (WP 08-PT.02) provides instructions for User's handling, use, and inspection of the TDOP.

5.0 QUALITY ASSURANCE REQUIREMENTS

5.1 Quality Assurance Program

The following quality elements have been established, as a minimum, to satisfy the requirements of 49 CFR 173.474, Quality Control for Construction of Packaging. Additionally, the Supplier shall plan, implement, and maintain a quality assurance QA program in accordance with NQA-1-1989.

All basic requirements of NQA-1 shall be addressed in the sellers QA program, except Design Control. Additional requirements specific to the TDOP are provided as follows.

5.1.1 Control of Measuring and Test Equipment

Calibration of Measuring and Test Equipment (M&TE) shall be traceable to the National Institute of Standards and Technology (NIST) or other approved Nationally Recognized Standard.

5.1.2 Handling, Storage, and Shipping

The TDOP shall be stored indoors, and shall be stored and shipped with;

- Bolts and gasket material individually wrapped and placed inside the TDOP
- Plugs in each TDOP coupling
- Lid installed with a minimum of 4 bolts.

Storage shall include a tamper evident seal (tape from lid to body) to prevent loss/tampering of removable components such as bolts or gasketing.

5.1.3 Inspection Requirements

Final inspection and acceptance by the Buyer will be conducted at the Seller's facility prior to shipment unless otherwise specified in purchase documents.

The Seller shall be responsible for all tests to ensure finished products meet the requirements of this specification. Test results shall be recorded and traceable to the manufacturing travelers and/or inspection reports in accordance with the Seller's quality program.

Note: Constrained assemblies are those held in place either by tooling and/or fixtures for the purposes of assembly or testing (e.g., lid assembly constrained in leak test fixture).

Note: Unconstrained assemblies are those not held in place by tooling and/or fixtures (e.g., body assembly on level surface with no tooling or fixtures restraining the assembly).

The Seller shall ensure that the following critical attributes are met through random inspections or other approved methods:

A. The lid panel of the lid assembly (unconstrained) shall be flat or concave (arch directed to the inside of the TDOP assembly). The body bottom panel of the body assembly (unconstrained) shall be flat, concave or convex. The total overall height of the TDOP including convexity shall not exceed 73 7/8”

B. The body assembly height shall be measured by placing the body assembly on a flat surface (unconstrained), placing a full span straight edge across the body flange, and measuring the distance from the flat surface to the contact surface of the straight edge. The measurement, including convexity, shall not exceed 73" and shall not be less than 72 1/8".

C. The lid assembly concavity shall be measured by placing the lid assembly on a flat surface (constrained or unconstrained), placing a full span straight edge across the lid assembly, and measuring the distance from the center of the lid panel to the contact surface of the straight edge. The measurement shall not exceed 1-1/4" (including weld reinforcement height).

D. The lid assembly flatness shall be measured by placing the lid assembly on a flat surface (unconstrained), measuring the distance from bottom edge of the lid band to the flat surface, the measurement shall not exceed 5/8" anywhere along the diameter of the lid.

E. If pipe couplings are used, the restored internal 3/4"-NPT thread profile (inboard) shall be verified by inserting a notched plug gage and tightening by hand. The thread is within permissible tolerance when the gauging notch of the plug gage is not more than plus 1-1/2 turns or minus ½ turn from being flush with the end of the thread.

5.1.4 Control of Special Processes

Non-destructive examination personnel shall be certified per the requirements of ASNT Recommended Practice No. SNT-TC-1A. Personnel holding either Level II or Level III certifications shall perform and sign all test reports.

Visual weld inspection personnel shall be qualified per AWS D1.1.

Welding personnel shall be qualified per AWS D1.1, or ASME Section IX for the processes used.

5.1.5 Documentation Requirements

The Seller shall submit a Data Package with each completed TDOP, or for a list of itemized TDOPs. At a minimum the Data Package will include: Certificate of Compliance, (C of C), CMTRs, all inspection and test reports, fabrication travelers, and a list of M&TE used.

The Seller's C of C shall be signed by an officer of the Sellers' Organization, certifying the conformance of the supplied items to the requirements of this specification (including contract drawings). The C of C shall be traceable to the serial number(s) of the component(s).

The Seller shall retain the production documentation (i.e., CMTRs, travelers, test/inspection reports, etc.) on each TDOP or lot of TDOPs for a minimum of 1 year from the date of delivery, unless otherwise directed by the Buyer.

Additional site specific requirements may be specified by the Buyer in the Purchase Order.

6.0 SUBMITTALS

This section describes the documents the Seller shall submit to the Buyer, when the documents shall be submitted, and whether the documents shall be submitted for record or approval.

The Seller shall incorporate changes as required by Buyer comments and resubmit for review.

Upon approval of submitted documents, the Seller shall not modify project specific parts of the documents listed on Attachment A without the approval of the Buyer.

ATTACHMENT A - Document Submittal Requirements

DOCUMENT SUBMITTAL REQUIREMENTS			
SUBMIT DOCUMENTS PRIOR TO THE POINTS INDICATED BY THE CODE BELOW:			
F - FABRICATION T - TESTING S - SHIPMENT	C - CONSTRUCTION/INSTALLATION A - FINAL ACCEPTANCE		
Document Requirements	See Paragraph	For Approval	For Record
1. Quality Assurance Program Manual	5.1	F	
2. Manufacturing Travelers	3.3	F	A
3. Welding Procedure	3.3.2	F	
4. Leak Test Procedure	3.3.4A	T	
5. Certified Material Test Reports Chemical and Physical Properties	3.2		A
6. Visual Weld Inspection Procedure	3.3.2	F	
7. Paint/coating Pre-Qualification Report Paint/coating Manufacturer's Application Instructions Specification Certification of less than 0.05% lead	3.4.1	F	
8. Paint/coating and Inspection Procedure	3.4.1B	F	
9. NDE/Inspection Personnel Qualification	3.3.2, 5.1.4	F	
10. Welder Qualification	3.3.2, 5.1.4	F	
11. Fastener Certification (Cap Screws)	3.2	S	A
12. Serial Number Traceability Process	3.3.3	F	
13. Supplier's Certificate of Compliance	5.1.5		A
14. Procedure for Record Storage	5.1.5	F	

DOCUMENT SUBMITTAL REQUIREMENTS			
SUBMIT DOCUMENTS PRIOR TO THE POINTS INDICATED BY THE CODE BELOW:			
F - FABRICATION T - TESTING S - SHIPMENT	C - CONSTRUCTION/INSTALLATION A - FINAL ACCEPTANCE		
15. Inspection/Test Reports	5.1.3		A
16. Measuring and Test Equipment List with Calibration due Dates	5.1.5		A
17. Final Data Package	5.1.5	S	A